CLAIMS

1. A lens assembly comprising, in order from an object side to an image side:
a first lens;
a first meniscus lens in optical communication with the first lens;
a second meniscus lens in optical communication with the first meniscus lens;
an aperture stop in optical communication with the second meniscus lens;
a fourth lens in optical communication with the aperture stop; and
a bi-convex lens in optical communication with the fourth lens.

2. The lens assembly of claim 1, wherein the first lens is a meniscus lens and the fourth lens is a meniscus lens.

3. The lens assembly of claim 2, wherein the second meniscus lens and the third meniscus lens are cemented together.

4. The lens assembly of claim 2, wherein the bi-convex lens is a perfect bi-convex lens.

5. The lens assembly of claim 1, wherein the first lens is a plano-convex lens and the fourth lens is a meniscus lens.

6. The lens assembly of claim 5, wherein the second meniscus lens and the third meniscus lens are cemented together.

7. The lens assembly of claim 5, wherein the bi-convex lens is a perfect bi-convex lens.

8. The lens assembly of claim 1, wherein the first lens is a meniscus lens and the fourth lens is a bi-concave lens.

9. The lens assembly of claim 8, wherein the second meniscus lens and the third meniscus lens are cemented together.

10. The lens assembly of claim 8, wherein the bi-convex lens is a perfect bi-convex lens.

11. The lens assembly of claim 1, wherein the first lens is a plano-convex lens and the fourth lens is a bi-concave lens.

12. The lens assembly of claim 11, wherein the second meniscus lens and the third meniscus lens are cemented together.

13. The lens assembly of claim 11, wherein the bi-convex lens is a perfect bi-convex lens.

14. The lens assembly of claim 1, further comprising at least one planar plate in disposed between the object side and the image side.

15. The lens assembly of claim 14, wherein the at least one planar plate includes one filter plate.

16. The lens assembly of claim 15, wherein the at least one planar plate further include a cover glass to cover a detector.

17. The lens assembly of claim 16, wherein the filter plate and the cover glass are disposed adjacent to each other.

18. The lens assembly of claim 15, wherein the filter plate is a low-pass filter plate.

19. The lens assembly of claim 15, wherein the filter plate is a color-correction filter plate.

20. The lens assembly of claim 1, wherein the first lens includes a first surface proximate the object side, and the bi-convex lens includes a second surface distal the object side, and wherein a distance between the first surface and the second surface is less than approximately 20 mm.

21. A lens assembly comprising:

a plurality of lenses for producing an image of an object, the plurality of lenses adapted to provide:

a field of view of approximately 15 degrees;

approximately 0% vignetting within the field of view; and

a distortion of the image of less than approximately 1%.

22. The lens assembly of claim 21, wherein the plurality of lenses are configured to define a focal length, and wherein a length of the plurality of lenses is approximately equal to the focal length.

23. The lens assembly of claim 21, further comprising:

an aperture stop in optical communication with the plurality of lenses.

24. The lens assembly of claim 23, wherein the plurality of lenses is non-symmetrical about the aperture stop.

25. The lens assembly of claim 21, further comprising:

at least one planar plate in optical communication with the plurality of lenses.

26. The lens assembly of claim 25, wherein the plurality of lenses is further adapted to provide:

offsetting aberrations to compensate for aberrations introduce by the at least one planar plate.

27. The lens assembly of claim 21, wherein the plurality of lenses includes five lenses.

28. The lens assembly of claim 27, wherein the five lenses include, in order from an object side to an image side:

a first lens;

a first meniscus lens;

a second meniscus lens;

a fourth lens; and

a bi-convex lens.

29. The lens assembly of claim 28, wherein the first lens is a plano-convex lens.

30. The lens assembly of claim 28, wherein the first lens is a meniscus lens.

31. The lens assembly of claim 28, wherein the fourth lens is a meniscus lens.

32. The lens assembly of claim 28, wherein the fourth lens is a bi-concave lens.

33. An imaging device for imaging an object, the imaging device comprising:

an imaging device housing;

a plurality of individual lens assemblies disposed at least partially within the image device housing; and

a plurality of detectors disposed at least partially within the image device housing, each detector optically arranged relative to a respective one of the lens assemblies to receive images from the respective lens assembly.

34. The imaging device of claim 33, wherein the image device housing comprises a plurality of lens assembly receptacles, each adapted to receive a respective one of the plurality of lens assemblies.

35. The imaging device of claim 33, wherein the plurality of lens assemblies comprises a first lens assembly and a separate second lens assembly.

36. The imaging device of claim 33, wherein the plurality of lens assemblies comprises a first lens assembly and a separate second lens assembly and wherein the image device housing comprises a first lens receptacle adapted to receive the first lens assembly and a second lens receptacle adapted to receive the second lens assembly.

37. The imaging device of claim 33, wherein each lens assembly of the plurality of lens assemblies is different, thereby providing a different image of the object.

38. The imaging device of claim 33, wherein the plurality of detectors comprises: a CCD detector, a CMOS detector, a film-based detector, or any combination thereof.

39. The imaging device of claim 33, wherein each lens assembly of the plurality of lens assemblies is arranged relative to the image device housing such that an optical viewing axis of each lens assembly is generally aligned.

40. The imaging device of claim 33, further comprising a mount coupled to the image device housing, wherein the mount is constructed to provide pan and tilt motion.

41. The imaging device of claim 33, wherein the image device housing comprises a one piece housing.

42. The imaging device of claim 33, further comprising a manually operable switch adapted to allow a user to switch a view of the object between at least two of the plurality of lens assemblies.

43. The imaging device of claim 33, further comprising a controller adapted to automatically switch a view of the object between at least two of the plurality of lens assemblies upon an occurrence of a pre-determined trigger event.

44. The imaging device of claim 33, wherein the imaging device housing is constructed to fit within a 1.5 inch by 1 inch by 0.75 inch envelope.

45. The imaging device of claim 33, wherein a first one of the plurality of lens assemblies comprises a lens assembly constructed to provide a relatively wide field of view of the object and a second one of the plurality of lens assemblies is constructed to provide a relatively magnified view of the object.

46. The imaging device of claim 45, wherein the first lens assembly is constructed to provide approximately a 40 degree field of view.

47. The imaging device of claim 45, wherein the second lens assembly is constructed to provide approximately a 15 degree field of view.

48. The imaging device of claim 33, wherein each of the plurality of lens assemblies is disposed within a lens housing, with the lens housing fastened to the image device housing.

49. The imaging device of claim 48, wherein the lens housing comprises a threaded body and wherein the image device housing comprises a threaded receptacle, wherein the lens housing is threaded into the receptacle.

50. A lens assembly comprising:

a first lens arrangement comprising at least one lens element having at least one initial parameter; and

a second lens arrangement in optical communication with the first lens arrangement, the second lens arrangement comprising at least one lens element having at least one initial parameter, wherein the first and second lens arrangements cooperate to produce an image having an image characteristic within a range of acceptable image characteristics;

wherein a first parameter of the at least one initial parameter of the first lens arrangement may be changed while maintaining one or more parameters of the at least one initial parameter of the second lens arrangement within a desired range so that the image characteristic is maintained within the range of acceptable image characteristics.

51. The lens assembly of claim 50, wherein the one or more parameters of the at least one initial parameter of the second lens arrangement include a radius of curvature.

52. The lens assembly of claim 51, wherein the radius is maintained within 10% of the initial radius of curvature.

53. The lens assembly of claim 50, wherein the one or more parameters of the second lens arrangement include an index of refraction.

54. The lens assembly of claim 53, wherein the index of refraction is maintained at a value substantially equal to the initial index of refraction.

55. The lens assembly of claim 50, wherein the one or more parameters of the second lens arrangement include a value of dispersion.

56. The lens assembly of claim 55, wherein the value of dispersion is maintained at a value substantially equal to the initial value of dispersion.

57. The lens assembly of claim 50, wherein the first lens arrangement and second lens arrangement combined is a five lens element lens assembly

58. The lens assembly of claim 57, wherein the first lens arrangement includes:
a first lens; and
a fourth lens.

59. The lens assembly of claim 58, wherein the second lens arrangement includes:
a second lens;
a third lens in optical communication with the second lens;
an aperture stop in optical communication with the third lens; and
a fifth lens in optical communication with the fourth lens.

60. The lens assembly of claim 59, wherein the first lens is a meniscus lens.

61. The lens assembly of claim 59, wherein second lens is a meniscus lens.

62. The lens assembly of claim 59, wherein the third lens is a meniscus lens.

63. The lens assembly of claim 59, wherein the fourth lens is a meniscus lens.

64. The lens assembly of claim 59, wherein the fifth lens is a bi-convex lens.

65. The lens assembly of claim 59, wherein the first lens is a plano-convex lens.

66. The lens assembly of claim 59, wherein the fourth lens is a bi-concave lens.

67. A lens system comprising a plurality of lens elements, and an aperture stop, each lens element having a lens surface defined by a radius of curvature (r), a thickness (d), an index of refraction (n), and a dispersion (v), the plurality of lens

elements being spaced from each other by a distance (d), the lens system satisfying at least one of the following conditions:

a) $0.98 * f < d_1+d_2+d_3+d_4+d_5+d_6+d_7+d_8+d_9+d_{10}+d_{11}+d_{12}+d_{13}+d_{14} < 1.02 * f$; or

b) $0.47 * f < d_1+d_2+d_3+d_4+d_5+d_6+d_7+d_8+d_9 < 0.61 * f$; or

c) $20.4 \text{ mm} < f_1 < 30.5 \text{ mm}$ when assembly scaled to $f = 25$ mm; or

d) $-100 \text{ mm} < f_{2,3} < 15 \text{ mm}$ when assembly scaled to $f = 25$ mm; or

e) $1.49 < n_1 < 1.52$ and $\nu_1 \geq 70$; or

f) $1.8 < n_2$ and $24 < \nu_2 < 26$; or

g) $-50 \text{ mm} < f_4 < -35 \text{ mm}$ when $1.5 < n_4 < 1.72$ and when assembly scaled to $f = 25$ mm; or

h) $110 \text{ mm} < f_5 < 540 \text{ mm}$ when $n_5 > 1.7$ and when assembly scaled to $f = 25$ mm; or

i) $r_7/r_{10} < 0.3$ when $n_4/n_5 > 0.98$; or

j) $r_7/r_{10} > 0.5$ when $n_4/n_5 < 0.90$;

where:

f represents an effective focal length of the plurality of lenses;

$f_1$ represents a focal length of a first lens element;

$f_4$ represents a focal length of a fourth lens element;

$f_5$ represents a focal length of a fifth lens element;

$f_{2,3}$ represents a focal length of a combination of a second lens element and a third lens element;

$d_1$ represents a thickness of the first lens element;

$d_2$ represents a gap distance from an image side surface of the first lens element to an object side surface of the second lens element;

$d_3$ represents a thickness of the second lens element;

$d_4$ represents a thickness of the third lens element;

$d_5$ represents a gap distance from an image side surface of the third lens element to the aperture stop;

$d_6$ represents a gap distance from the aperture stop to an object side surface of the fourth lens element;

$d_7$ represents a thickness of the fourth lens element;

$d_8$ represents a gap distance from an image side surface of the fourth lens element to an object side surface of the fifth lens element;

$d_9$ represents a thickness of the fifth lens element;

$d_{10}+d_{11}+d_{12}+d_{13}+d_{14}$ represents a gap distance from an image side surface of the fifth lens element to an image plane;

$n_1$ represents an index of refraction of the first lens element;

$n_2$ represents an index of refraction of the second lens element;

$n_4$ represents an index of refraction of the fourth lens element;

$n_5$ represents an index of refraction of the fifth lens element;

$v_1$ represents a dispersion of the first lens element;

$v_2$ represents a dispersion of the second lens element;

$v_4$ represents a dispersion of the fourth lens element;

$v_5$ represents a dispersion of the fifth lens element;

$r_7$ represents a radius of curvature of the object side surface of the fourth lens element; and

$r_{10}$ represents a radius of curvature of the image side surface of the fifth lens element.

68. The lens system according to claim 67, the lens system satisfying each of the conditions.

69. The lens system according to claim 67, the lens system satisfying a plurality of the conditions.

70. The lens system according to claim 67, the lens system further comprising a first planar plate, wherein $d_{11}$ represents a thickness of the first planar plate, and wherein d10 represents a gap distance from the image side surface of the fifth lens element to an object side surface of the first planar plate.

71. The lens assembly according to claim 70, wherein the first planar plate is a filter plate.

72. The lens system according to claim 70, the lens system further comprising a second planar plate, wherein d12 represents a gap distance from an image side surface of the first planar plate to an object side surface of the second planar plate, wherein $d_{13}$ represents a thickness of the second planar plate, and wherein $d_{14}$ represents a gap distance from an image side surface of the second planar plate to the image plane

73. The lens system according to claim 72, wherein the second planar plate is a cover glass.